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AXIAL ROTATION OF THE TESTICLE

(TORSION OF SPERMATIC CORD)

CAUSING STRANGULATION.

BY

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BIRMINGHAM.

Late H.P. at the B'ham
General Hosp!

May 11th - 95

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To -
Thomas Bryant Jr.
with compliments.

C Hubert Parry

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AXIAL ROTATION OF THE TESTICLE (TORSION OF SPERMATIC CORD) CAUSING STRANGULATION.

BY S. HERBERT PERRY, M.B. LOND., M.R.C.S., L.R.C P., BIRMINGHAM.

THE literature referring to this lesion is, I find, scanty in this country, and chiefly confined to the publication of isolated cases or small groups of cases. A good account of the condition is however given by J. Hutchinson, jun., in Fascic. X. of the *Pathological Atlas* published by the New Sydenham Society; and I am also much indebted to two articles published in the *Annals of Surgery*, Vols. 19 and 20, by Warbasse and Johnson respectively. The intention of this paper is to report three cases of the above condition which have occurred in my own experience, and to take a brief review of the previously published reports.

Judging from the extent of the literature of this subject, and from the fact that standard text-books of surgery practically ignore this lesion, it would seem that it should be of much rarity; but judging from my own experience I am inclined to think that it is not so rare as I had formerly supposed. My surgical experience has been somewhat limited, and therefore the fact of my having come across several cases of this spermatic cord torsion supports my contention.

As I gather from published reports, this condition has only been described when the torsion of the cord has been of a very acute form and the resulting strangulation of the testis very complete (of this form I have two cases to describe); but I more especially wish to draw attention to a class of case in which the torsion is of less degree and does not usually proceed to strangulation, and in which the patient is liable to frequently recurring attacks of torsion. Any one of these recurring attacks may doubtless advance to an acute stage, and I note a history of previous attacks in several of the reported cases.

These cases then of Rotation of the Testis with Torsion of the Cord fall into two clinical divisions:—(1) Those in which there is one sudden and acute attack; (2) Those in which there is more or less frequent recurrence, with or without the eventual onset of an acute degree of torsion.

There is some evidence to the effect that frequent attacks of torsion tend to cause atrophy of the testis; no definite relation to varicocele has however been noted.

Case 1.—The first case that came to my notice was a typical example of an acute strangulation of the testicle. The patient, a lad aged 16 years, was brought to the General Hospital one evening about 8 p.m. in a rather collapsed condition, and complaining of great pain in the scrotum and right inguinal region. He was pallid and sweating; evidently in great pain. He had vomited once immediately before admission to the Hospital. He stated that the pain came on while he was lying upon a bench asleep before the fire; he could not state more accurately the position in which he was lying. He was brought to the Hospital about two hours after the onset of pain.

On examination of the scrotum, a swelling resembling a tense varicocele was found extending from the right external inguinal ring to the testicle, which lay at the bottom of the scrotum. The part was extremely painful and tender, and the right thigh semiflexed on the abdomen. The fact that no hernia existed was easily made out. Manipulation was very difficult owing to the marked tenderness, but after many careful attempts at rotation I found that twisting the testicle through two full turns from left to right reduced the torsion, and the swelling rapidly disappeared. That is—the cord was twisted through two turns from right to left, the point of torsion being apparently at the external inguinal ring. The left testicle was normally placed, and there was no hernia. The attempts at rotation occupied about ten minutes. The boy was at once almost entirely free from pain, and expressed himself as "feeling all right again."

The patient was told to come up to the Hospital next morning in order to permit of a careful examination, but he never appeared again. He was instructed in the method of untwisting the cord in case another attack should occur. There was no history of any previous attack.

I have little doubt that, if this case had remained untreated for a few hours longer, it would have passed on to complete strangulation of the testicle and required operation. The case closely resembles that reported by Nash (7), which was—as far as I am aware—the first case of the kind reported in which the rotation was reduced without operation. Nash later reported that the testicle showed signs of atrophy.

Case 2.—This case was one in which many recurring attacks of rotation took place, with the supervention of an acute attack. The patient was aged twenty-five when I first saw him. He stated that at various intervals, generally of two to three months, during the past fourteen years he had been subject to attacks of severe pain in the right side of the scrotum, accompanied by swelling and great tenderness of the part. The first attack came on at the age of eleven years, while he was asleep at night, and passed off after bathing the scrotum in hot water; the untwisting of the cord being no doubt effected by the manipulation involved in this procedure. Many similar attacks occurred during the ensuing ten years, always relieved—as at first—by bathing with hot water. About two-thirds of these attacks came on during the day, and the patient latterly noticed that they might be brought on by sitting with the right thigh crossed upon the left.

I first saw this patient some four years ago when he suffered from his most acute attack; he was then 25 years of age. I was sent for to see him at night, about four o'clock, the attack having come on during sleep. He was pale, sweating on the forehead, and complaining of great pain. On examination of the scrotum, a fairly tense and pyriform-shaped swelling was found extending from the right testicle upwards to the external ring. Both testicles were situated at the bottom of the scrotum, and there was no hernia on either side. The right testicle was hanging with its free border downwards and a loop of epidydimis projected forwards. I found subsequently that this was the usual position. After some considerable manipulation I found that one complete turn from left to right reduced the cord torsion, which was therefore, as in Case 1, from right to left. The condition of torsion had persisted for about two hours before reduction was effected, and could not be relieved by hot bathing as had former attacks. This patient had not vomited, but was undoubtedly in great distress. Within half an hour of untwisting the cord the parts were normal, though still painful and tender, except for a slight varicocele on the right side. The patient was able to resume his occupation on the following day.

Since then (that is during the past four years) there have been many slight attacks, but the patient can now untwist the cord himself. The direction of rotation is always from right to left, and usually through one full turn I imagine that the slight varicocele present in this case may be due to the repeated recurrence of cord torsion, but a slight degree of varicocele is too common to have any significance. The right testicle is definitely smaller than the left; the nutrition of the gland has probably suffered, but it is not actually atrophied. The left testicle is normal in all respects; the right hangs as above stated, and about one inch below the left.

Previously this patient's condition was a source of great trouble to him, but now that he understands the method to be adopted for relief it is of much less consequence to him. It is curious to note that he never consulted anyone with reference to his condition until the onset of an acute attack left him no option in the matter.

Case 3.—The third and last case is one of recurrent attacks of rotation of the testicle, without any very acute attack.

The patient, a ship's boy, aged sixteen years, applied to me concerning attacks of scrotal pain which often troubled him. He stated that the pain sometimes came on during exercise and sometimes when sitting or lying down. He had suffered from this condition for three years, and of late the attacks had been more severe and more frequent. The right testicle, the one affected had descended only halfway down the scrotum. The left testicle was normally situated. There was no hernia. A month later I had an opportunity of seeing an attack; the pains coming on while the boy was engaged in hard work. The right testicle was found to be rotated through one complete turn from left to right, differing in this respect from the first two cases. The point of torsion appeared to be situated about one inch above the testicle, the cord being swollen and tender below this point. The cord was in this case easily untwisted, and the patient readily acquainted with the method. I have long since lost sight of this patient.

This concludes the cases that have come under my own notice. Of the reported cases of this lesion I have collected nineteen; very probably this does not include all that have been reported, but it is a sufficient number on which to base certain conclusions.

AGE AT WHICH LESION OCCURRED.

Below 10 years.	*10 to 20 years. (inclusive).*	*20 to 30 years.*	*Above 30 years.*
One at birth.	12 cases.	3 cases	One age 33 years.
One age 4 years.			One age 62 years.

Of the nineteen cases therefore, two-thirds occurred between ten and twenty years of age; or, adding my own three cases, fifteen out of twenty-two are included in this period of life.

The youngest case was recently reported in the *Brit. Med. Journal* (Taylor, 19). In this case symptoms were observed within four hours of birth. The right testicle was noticed to be somewhat enlarged, and later it was seen to be twice the size of the left and "appeared discoloured through the skin." The testicle was removed and reported on by Mr. C. B. Lockwood to the effect that—"the spermatic cord is twisted apparently just above the tunica vaginalis." The extent and direction of rotation is not noted.

The greatest age is noted in a case aged 62 years, reported by Nicoladoni (14). In this case the testicle was normally situated and there was no hernia; possibly abnormal mobility was the predisposing cause, but if so one might expect rotation to be determined at an earlier age. Possibly the absorption of tissue, consequent on advancing age, might have increased the mobility of the testicle and cord. The attack came on after hard physical work. It is evident that the bulk of cases belong to the period of youth and early manhood, and occur about the age at which the gland takes on its function; possibly there is some connection between the lesion and the advent of function to the testis, but it is not obvious.

THE SIDE ON WHICH LESION OCCURS.

Right side—15 cases. Left side—7 cases.

There does not seem to be any very definite reason for this predominence of right over left-sided cases, unless in the fact that violent movements are more likely to be made with the right than the left leg. It is noteworthy also that, in my second case, the patient could frequently produce rotation of the testicle by sitting with the right thigh crossed upon the left; he was very definite on this point.

THE SITUATION OF THE TESTICLE.

Normal (*i. e.*, at bottom of scrotum) 10. Abnormal, 12.

Of the twelve abnormal cases, the testicle lay in the inguinal canal in six. Hernia of some form is noted as present in four cases, in two of which the testicle was situated at the bottom of the scrotum; so that, of twenty-two cases there are only eight in which some obvious abnormality of the part did not exist.

THE CAUSATION OF ROTATION.

It is obvious that the chief predisposing cause must lie in an abnormal mobility of the testicle or cord, or of both. Such abnormality may be due to developmental defects or to later changes. The exciting causes may be referred to certain move-

Reported by	*Age of Patient.*	*Side.*	*Cause; or time of onset.*	*Situation of Testicle.*	*Direction and Extent of Torsion.*	*? Hernia.*	*Treatment.*	*Journal.*
1. Whipple. Nash ...	16	Left	Strain	Upper part of Scrotum	Two turns	Band of omentum round hilum of Testis	Testis removed	Bryant.
2. Bryant	15	Left	At night, after exertion	,, ,,	One and half turns to left	None	Untwisted. Atrophy	Roy. Med. Chir. Trans., Vol.
3. Keen	23	Right	Not stated	Inguinal canal	One and half turns	Oblique ingl. reduc. hernia	Testis removed	lxxv., p. 247.
4. Davies-Colley ..	14	Right	Not stated	,,	One and half turns to right	None	Testis sloughed after operation	B. M. J., 1892, Vol. i., p. 811.
5. Page	17	Right	Onset at night	Normal	Two turns to right	Congenital Inguinal Hernia	Removal	Lancet, July 30th, 1892.
6. Langton	33	Left	Not stated	,,	Twist through epidydimis	None	Testis sloughed after operation	St. Bart. Hosp. Rep., V. xvii., p. 188.
7. Nash*	19	Right	After boxing	,,	Half turn to left	,,	Untwisted without operation	B. M. J., April 8th, 1893.
8. Barker	15	Right	Not stated	Half-way down Scrotum	One and half turns to right	Doubtful	Testis removed	Lancet, April 8th, 1893.
9. Owen	13	Left	After bowling at cricket	Normal	Half turn	None	,,	B. M. J., November 18th, 1893.
10. Cohen	20	Right	Not stated	Undescended	Two turns to left	,,	,,	
11. Gervais. Mickulicz	4	Left	Onset two days after a fall of twelve feet	Descended	Two turns	Not stated	Torsion reduced by operation. Part of Testis sloughed	
12. Helferich	21	Right	Onset at night	In inguinal canal	Two turns to left	,,	Testis removed	
13. Nicoladoni ...	16	Right	Not stated	,,	One turn to left	None	Removal of Testis	Quoted from Annals of Surgery.
14. Nicoladoni ...	62	Right	After hard work	Normal	One turn	Not stated	,,	Johnson. Vol. xix., p. 530.
15. Johnson	20	Left	Strain	Descended	One and half turns to left	Inguinal hernia	,,	Warbasse. Vol. xx., p. 97.
16. Czerny. Myer ...	18	Right	On sneezing	At external inguinal ring	,, ,,	Not stated	Operation. Torsion reduced	
17. Anders	13	Left	Not stated	In inguinal canal	One and half turns of Epidydimis	None	Removal	
18. Lauenstein ...	25	Right	Onset while at work	,,	One turn to right	Not stated	,,	
19. Taylor	at birth	Right	Noticed first four hours after birth	Normal	Not noted	None	,,	B. M. J., Feb. 20th, 1897, p. 468. 5

* Nash (7) reports (B. M. J.. Vol. i.. 1895, p. 135) that his patient states on November 3rd, 1894, that "the right testicle is considerably smaller than the other."

Brazil (B. M. J, 2, 1893, p. 13) reports the case of a patient having a left varicocele, with the left testicle smaller than the right, and with the epidydimis in front, and the cord arising from the upper border of the testicle. Ten years previously this patient had an attack of scrotal pain after lifting a heavy weight.

ments of the body or limbs, or to some unusual action of muscles entering into the formation of the spermatic cord.

As above stated, in only eight out of twenty-two cases was there no obvious abnormality, and it does not seem unreasonable to suppose that in some of these eight cases small but unobservable abnormalities existed, sufficient to determine the mobility necessary for rotation; such as the want of adhesions between the testicle and surrounding parts.

The chief factor among predisposing causes is probably some defective formation or attachment of the gubernaculum testis, first described by Curling, whose description has more lately been almost entirely confirmed by Lockwood. The portion of the gubernaculum chiefly at fault being the middle strand which descends and is attached to the bottom of the scrotum; since that portion is specially associated with the descent of the testicle below the inguinal canal. This middle strand of the gubernaculum has probably also the function of attaching and anchoring the testicle to the bottom of the scrotum. Curling writes (Dis. of the Testis, 4 edit., p. 20) "The lower part of the gland which is uncovered by serous membrane is often found connected to the bottom of the scrotum by a band of firm and dense connective tissue." The existence or non-existence of this adhesion must largely affect the mobility of the testicle. Absence or imperfect development of the gubernaculum might also cause abnormal mobility of the constituent parts of the spermatic cord.

Other causes may be found in abnormal adhesions formed during the descent of the testicle; in a patent funicular process, or in hernia of various form. Shortness of the cord has also been suggested, but shortness is probably due to adaptation. Of the exciting causes of rotation of the testicle the two most likely factors seem to be: (1) Unusual action of the cremaster muscle; (2) Certain movements of the body or limbs.

J. Hutchinson, junr. (*loc. cit.*), suggests that "possibly a sudden contraction of some of the more oblique fibres of the cremaster may have some effect in its mechanism" (*i.e.* the mechanism of rotation). This theory seems be the most reasonable one with regard to those cases in which rotation appears after or during physical work or sudden exertion. A typical case of this nature is recorded by Czerny (16), in which the rotation seemed to be caused by a sudden sneezing, the testicle lying at the external ring. In a case recorded by Nash (7), the pain came on after boxing; possibly the twisting of the cord took place during the boxing. Davies-Colley (4), says of the case which he reported, "I am disposed to attribute the twisting to some slow change produced by the downward pull of the gubernaculum testis modified by the resistance of adhesions." In this case the testicle lay in the inguinal canal.

Hutchinson sums up in the following words: "The general statement may safely be made, that torsion of the cord occurs chiefly in those cases where the testis is abnormally mobile, either from imperfect descent or from absence of the usual adhesions to the bottom of the scrotum." In a fair number of cases rotation has occurred when the patient was at rest, and in several cases during sleep. In five out of twenty-two cases there is a history of onset during rest, and in four of these the attack came on at night. It seems possible that movement of one thigh upon the other might, by producing a rolling movement of the cord, cause twisting when the testicle is situated in the scrotum. Such a theory is suggested to me by the statement of my second patient to the effect that he could bring on an attack by crossing his thighs. Another cause may be found in the movements caused by coughing and deep respiratory action; this more especially with reference to a testicle situated in the inguinal canal.

Into the question of diagnosis I do not wish to venture far. The ease of diagnosis must certainly depend greatly on whether the testis is descended or not. In the case of an undescended testicle combined with hernia a certain diagnosis may well be difficult; but operation would almost certainly be necessary in such case. In reported cases the symptoms have not infrequently been stated to resemble those of strangulated hernia.

There would however be no increased tension in a co-existing hernia, and, as far as I am aware, the vomiting of cord tension would be but slight in extent as compared with that caused by intestinal obstruction. The difficulty of diagnosis is in all cases half over when one has in one's mind the possible conditions, and one reason for bringing forward these cases is, that I do not think that strangulation of the testicle, though well recognised by surgeons, has as yet taken its place as a clinical entity in the minds of most practitioners, and it is to doctors in general practice that this condition will most often present itself. My belief is borne out by the fact that according to reports several of these cases were first looked upon as orchitis, periorchitis, etc.

The treatment must always consist in reduction of the torsion without operation if possible. In any acute case an anæsthetic would be of great value. In cases where more or less slight attacks of torsion constantly recur, it seems possible that suturing the testis to the lower end of the scrotum might be of value. Slight degrees of torsion must tend to untwist as soon as the veins become sufficiently distended, as any twisted elastic tube would under similar circumstances. Finally I venture to draw the following conclusions :—

1. The lesion may affect undescended or descended testis. Hutchinson speaks of torsion as being a "complication of incomplete descent of the testis," and states that "the remarkable fact about torsion of the spermatic cord is that in almost all the published cases it has affected an imperfectly descended testicle." I have shown that this statement is not borne out by the cases I have here collected—normally situated, 10; abnormally situated, 12. When the testis is normally situated it is very probable that its mobility is abnormal.

2. The predisposing causes in addition to imperfect descent are probably—

(*a*) Defective development of the gubernaculum testis.
(*b*) Defective formation of adhesions, or the formation of abnormal adhesions.
(*c*) Shortness of the cord.

(*d*) The co-existence of other abnormality (*i. e.*, hernia, patent funicular process).

3. The most likely exciting causes are—
   (*a*) Unusual action of the cremaster muscle.
   (*b*) Certain movements of the body or legs.
   (*c*) Sudden and violent respiratory movements.

4. Nothing very definite can be deduced from a consideration of the direction of the torsion. Lauenstein (quoted by Warbasse, *Annals Surg.*, Vol. 20, p. 107) state that "the fact that in five cases of right-sided inguinal testicle a left spiral twisting of the cord took place, is similar to the observation of Küstner, that right-sided ovarian tumours tend to undergo a left spiral torsion of the pedicle, and ovarian tumours of the left side tend to undergo a right spiral torsion."

In twenty-two cases the direction of torsion is as below (when noted).

Right cord.		Left cord.	
R. to L.—7.	L. to R —5.	R. to L.—2.	L. to R.—0.

The right to left rotation has therefore a majority of two on either side, and of fourteen cases in which the direction of torsion is noticed, nine have a right to left rotation. This does not support Lauenstein's suggestion.

5. Repeated attacks of torsion may possibly tend to cause atrophy of the testis; there is not much evidence on this point. In the case reported by Nash (7), the testicle has since been noted to be smaller than its fellow, and a similar fact was noted in my second case. I cannot find any evidence as regards the relation of torsion to varicocele, except that slight varicocele existed in my second case.

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